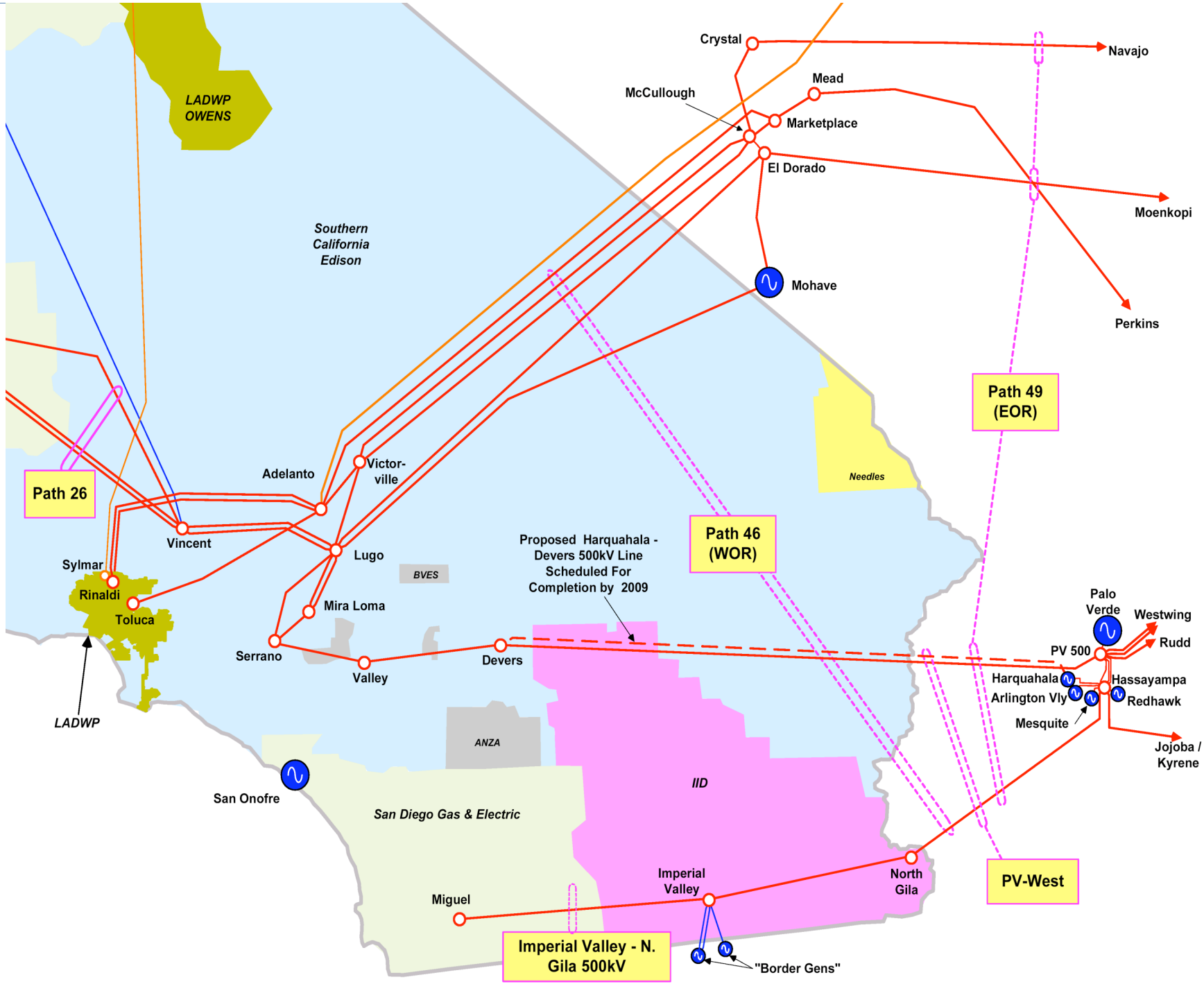
Part 1
Strategic Transmission Planning Issues
Item III

A. Update on Southern California Congestion

B. Quantification of Operational Reliability Benefits of Economic Projects

C. Assessment of LADWP/SCE Interconnection Issues

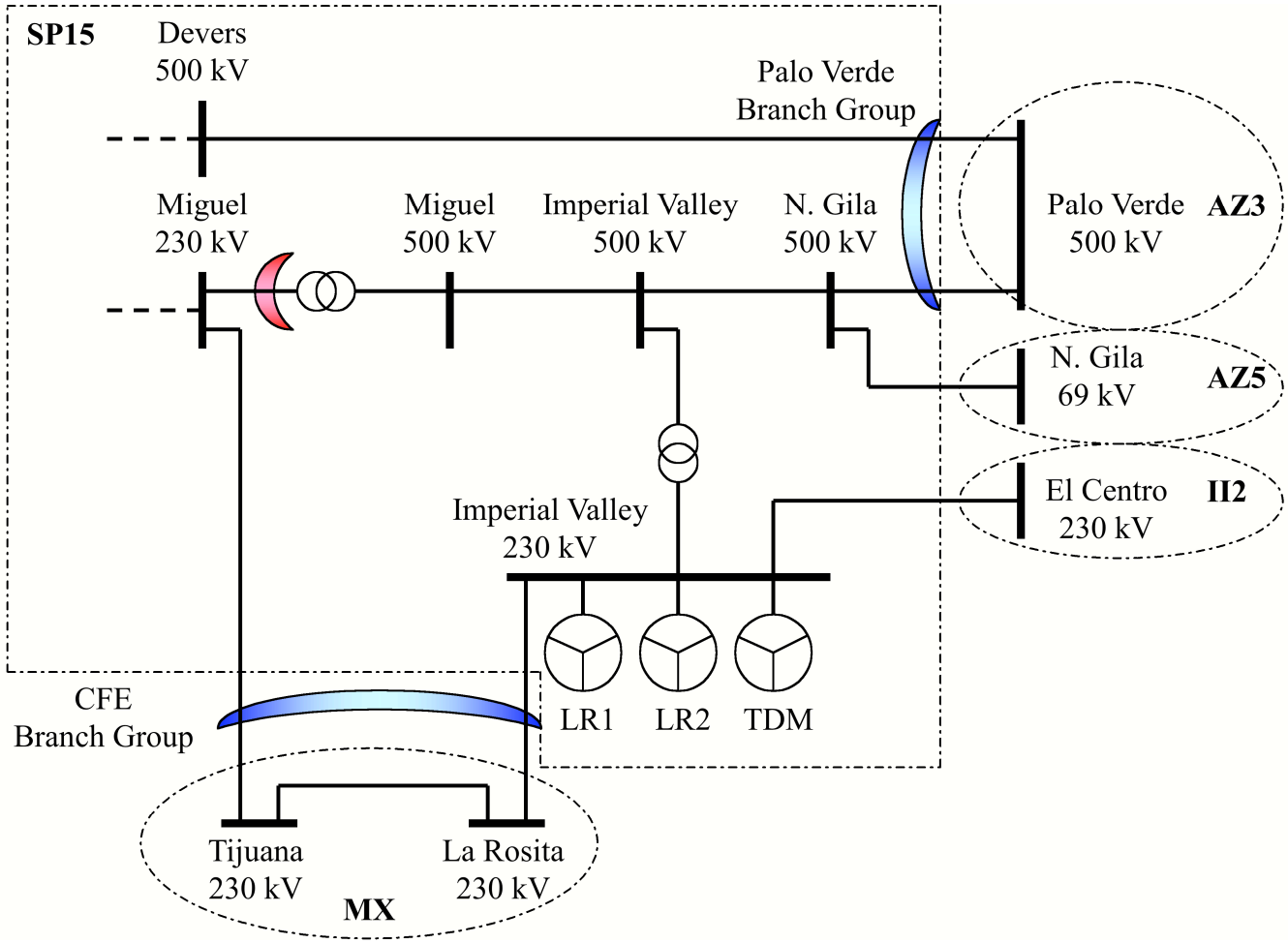
A. Update on Southern California Congestion


Crystal
Navajo
Mead
McCullough
Marketplace
El Dorado
Moenkopi
Perkins
Mohave
LADWP
OWENS
Southern
California
Edison
Path 49
(EOR)
Path 26
Adelanto
Victor-
ville
Needles
Vincent
Path 46
(WOR)
Proposed Harquahala -
Devers 500kV Line
Scheduled For
Completion by 2009
Sylmar
Lugo
BVES
Rinaldi
Toluca
Mira Loma
Palo
Verde
Westwing
Rudd
PV 500
Serrano
Valley
Devers
Harquahala
Hassayampa
Arlington Vly
Redhawk
Mesquite
Jojoba /
Kyrene
LADWP
ANZA
San Onofre
IID
San Diego Gas & Electric
Imperial
Valley
North
Gila
PV-West
Miguel
Imperial Valley - N.
Gila 500kV
"Border Gens"

Palo Verde Area – New Generation Projects

	WECC Sig Adds Reports				PLANT RATINGS, OTHER			
	Net Capacity, MW		Commercial	SigAdds	From	Powerflow Data		From
	Net Capacity		Operation	Report	CEC	Net Capacity, MW		Other
	Summer	Winter	Date	Year	5/31/05	Pgen	Pmax	Sources
Redhawk	1006	1028	July, 2002	2003	1060	864	984	1072
Arlington	570	580	July, 2002	2003	580	600	700	
Mesquite I	625	625	Jun, 2003	2004	625	494	691	625
Mesquite II	625	625	Nov, 2003	2004	625	494	691	625
Harquahala	836	860	Sept, 2003	2004	1170	1113	1128	

Southern California / Arizona / Mexico Transmission Constraints



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PV – West Branch Group

- Branch Group is PV-Devers 500 and Hassayampa – N. Gila 500
- PV area generators bid into the ISO market, bids are competitive as plants are new efficient combined cycle with cheaper gas (they don't pay LA City gate prices)
- Apparent loadings above the branch group ratings are probably due to bypassing series caps in the Hassayampa – N. Gila line to reduce flow on the branch group – increases BG rating by removing constraint but impacts overall EOR Path and participants

Imperial Valley – Miguel Area

- During 2003 – 2004 high congestion costs, constraint was Miguel 500/230 transformer & system from Miguel to San Diego
- Dec'ing on Border Gens (Radial Feeds into Imperial Valley 230) to relieve congestion on Miguel 500/230
- In October of 2004, a second transformer was added at Miguel
- Although the congestion problem has been greatly reduced, Congestion has now moved to "south of Miguel" on the 138/230kV system
- Miguel – Mission 230 #2 was recently placed into service on a temporary basis to reduce "south of Miguel" congestion.

Imperial Valley - Miguel

- Congestion Management physically successful, only a few hours where flows drifted above the transfer limit
- Between July 2003 and September 2004 approximately $32 million was spent on redispatch alone.
- Add in the MLCC and RMR costs and the actual congestion expenditures are much higher.

System Upgrades for PV-West and IV-Miguel Constraints

- East-of-the-River (EOR) 9000+ WECC Phase 2 rating study is nearing completion. Project would upgrade series caps to gain more than 1000 MW capacity in EOR

- Harquahala – Devers 500 (PV-Devers-2), Phase 2 study report was recently approved (7/25). (Should achieve Phase 3 shortly.) Project in service by 2009-10.

- SDG&E is studying options for a new 500kV line from the Imperial Valley area to central or northern portions of the SDG&E system

Congestion Management Costs

- Congestion costs (Redispatch only) incurred for Miguel for July 2003 through September 2004 totaled roughly $32 million
- This probably in the same cost range as the construction required to install the Miguel and Imperial Valley 500/230 transformers
- If 1000 MW of generation were added to the “border gens” next year, the transmission to cure congestion could not be built until 2010 or beyond
- ISO’s Amendment 50 to establish “reference dec bids” to mitigate dec gaming was already in effect for time period noted above

The Bigger Picture

- Generation can site and construct much faster than transmission lines can be studied, permitted, and constructed
- Congestion Management cost signals are not forward looking. CaISO needs a tool that will predict congestion and get transmission upgrades in a more timely manner.

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B. Quantification of Operational Reliability Benefits of Economic Projects

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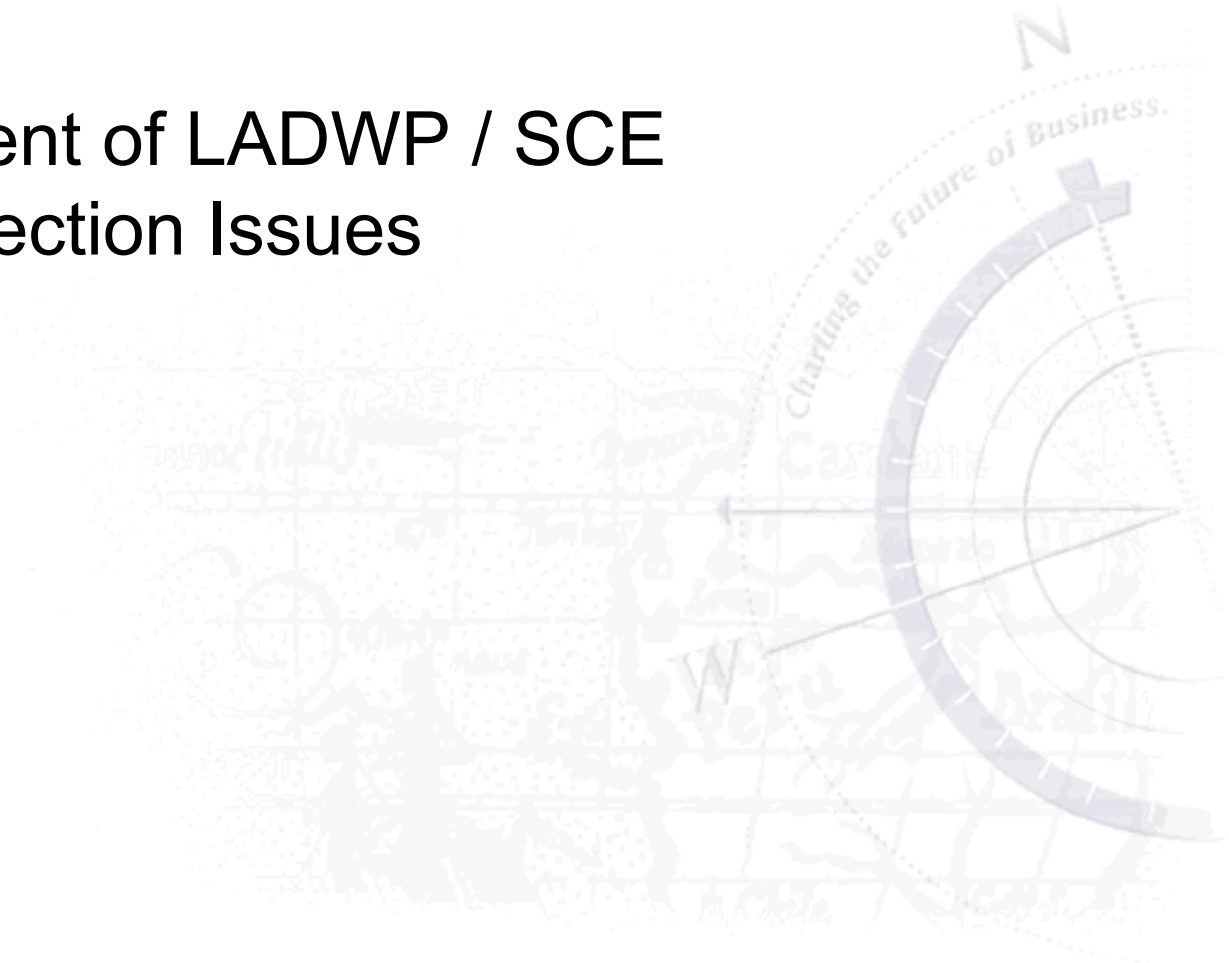
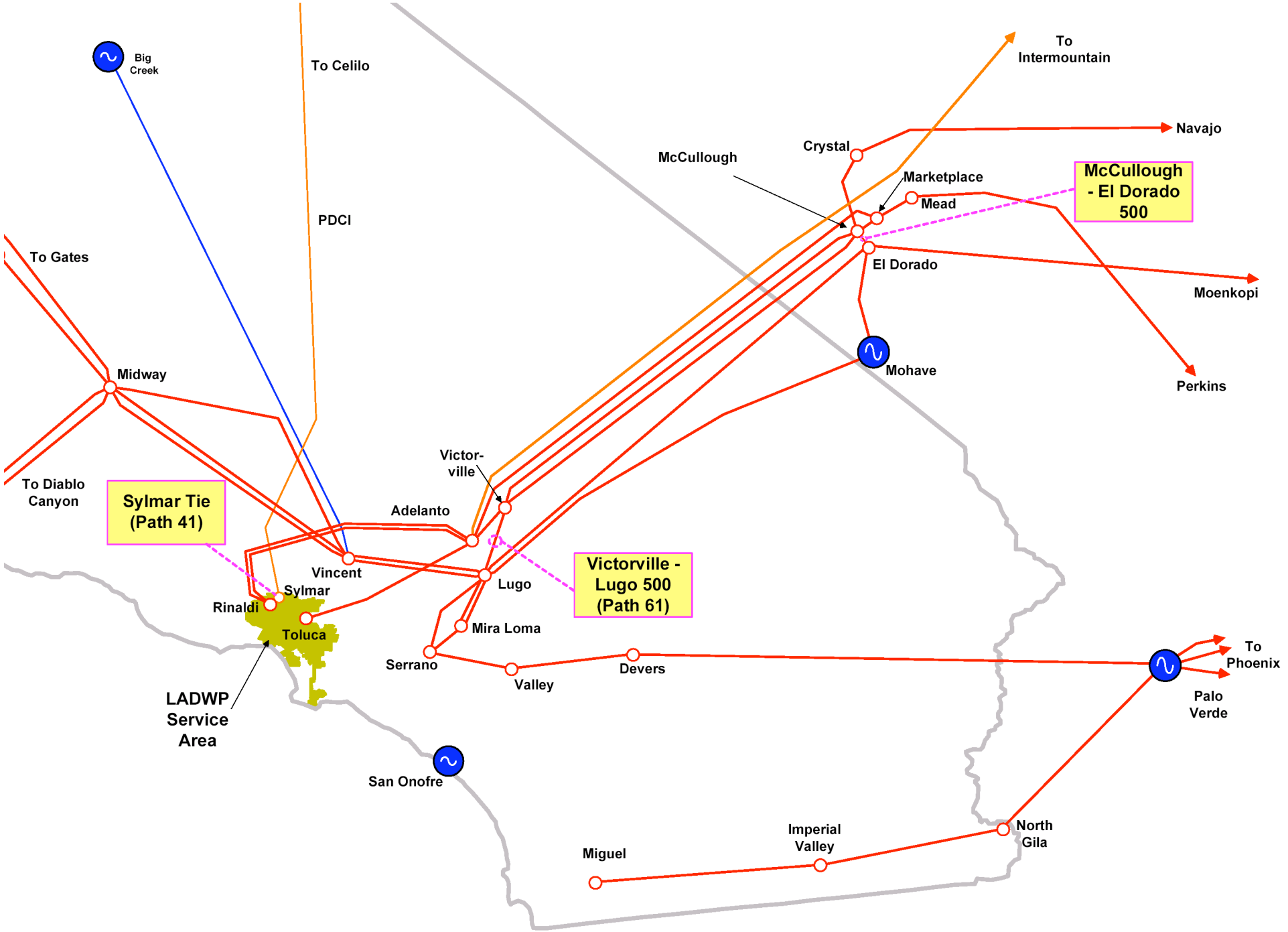
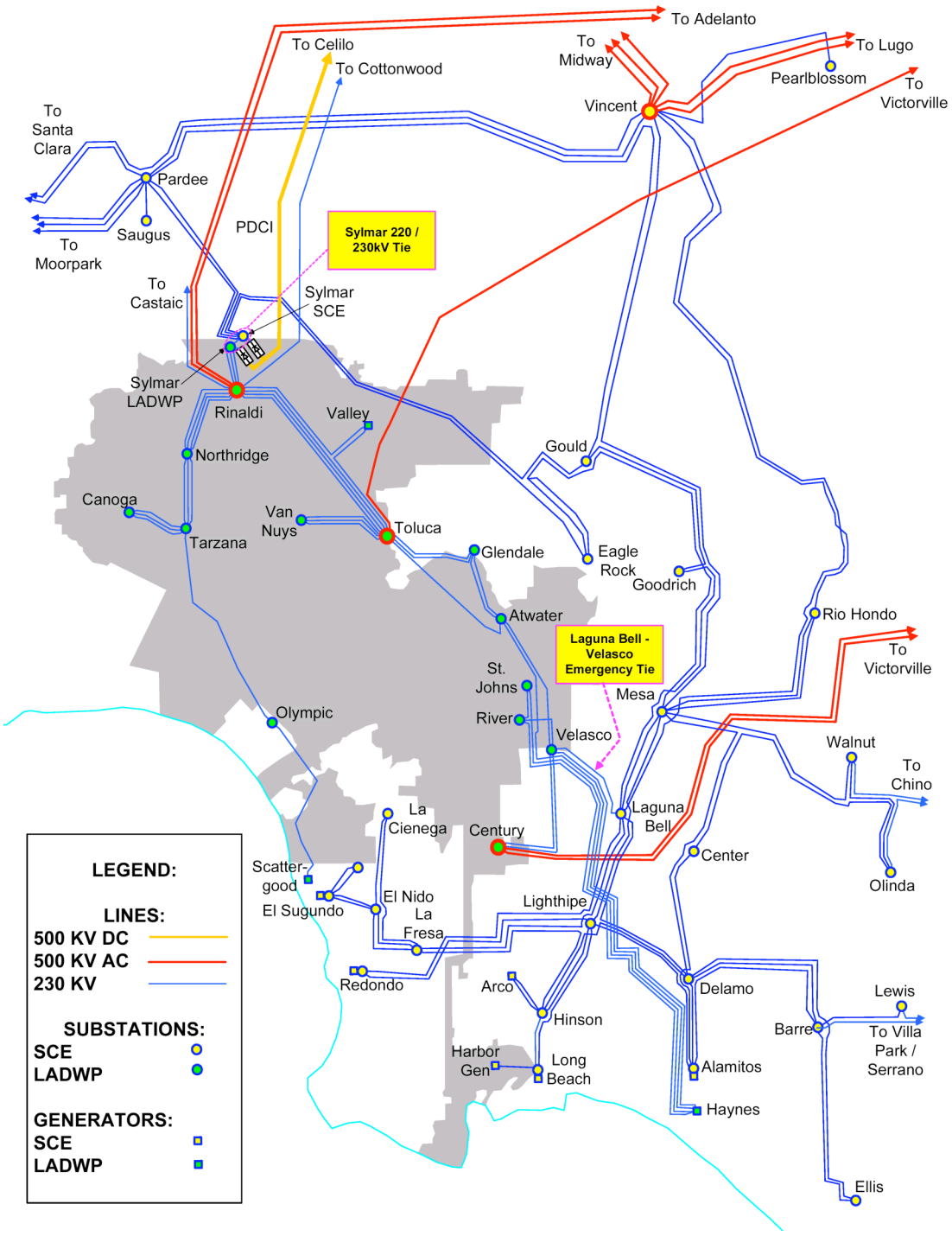
C. Assessment of LADWP / SCE Interconnection Issues




Big Creek
To Celilo
To Intermountain
Navajo
Crystal
McCullough
Marketplace
Mead
McCullough - El Dorado 500
PDCI
To Gates
El Dorado
Moenkopi
Midway
Mohave
Perkins
Victor-ville
To Diablo Canyon
Sylmar Tie (Path 41)
Adelanto
Vincent
Lugo
Victorville - Lugo 500 (Path 61)
Sylmar
Rinaldi
Toluca
Mira Loma
LADWP Service Area
Serrano
Valley
Devers
To Phoenix
Palo Verde
San Onofre
Imperial Valley
North Gila
Miguel



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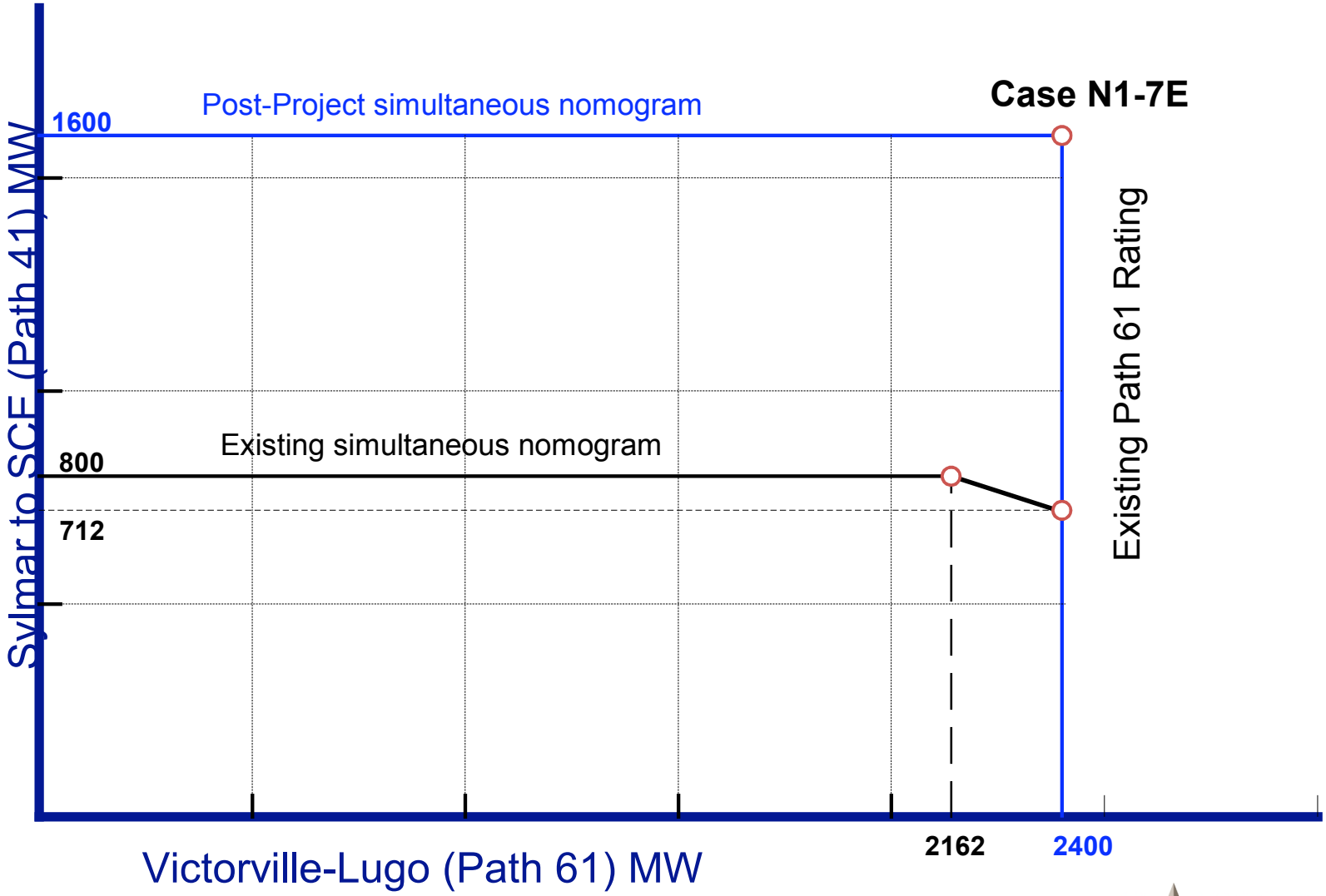
Sylmar (Path 41) vs Victorville – Lugo (Path61) Nomogram



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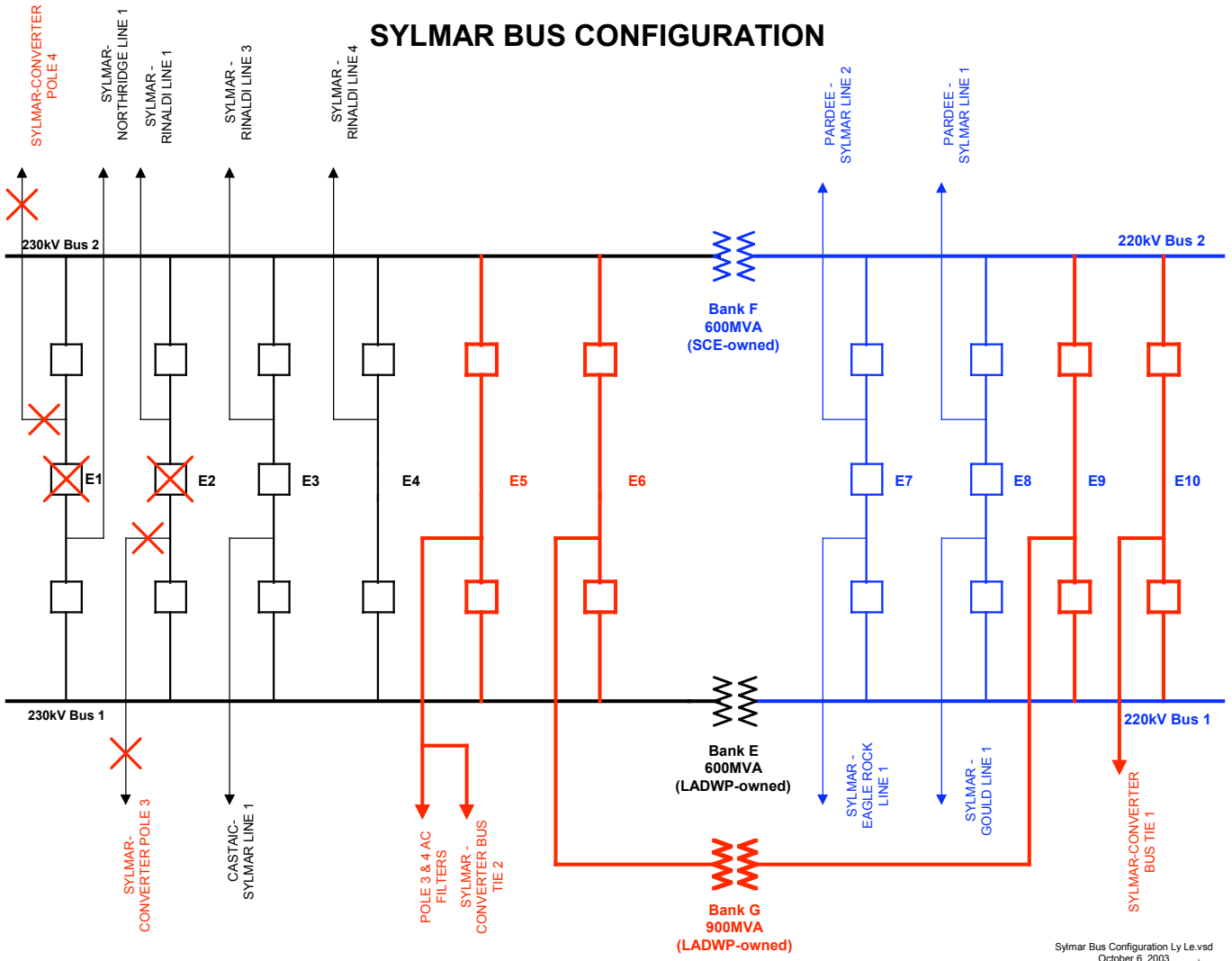
Sylmar Interconnection



Sylmar Bus Configuration Ly Le.vsd
October 6, 2003

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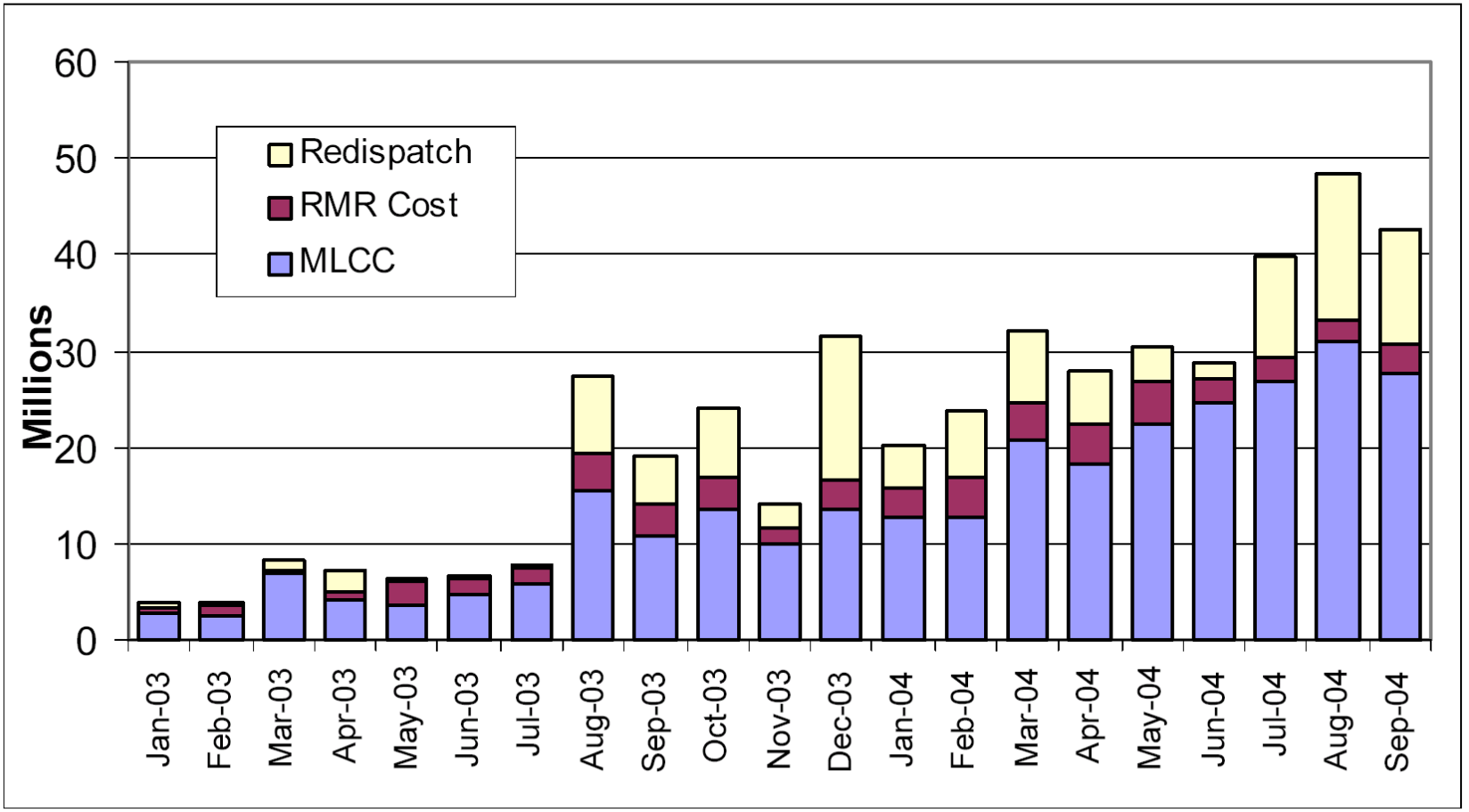
Monthly Total Intra-Zonal Congestion Costs

Figure 6. Monthly Total Intrazonal Congestion Costs



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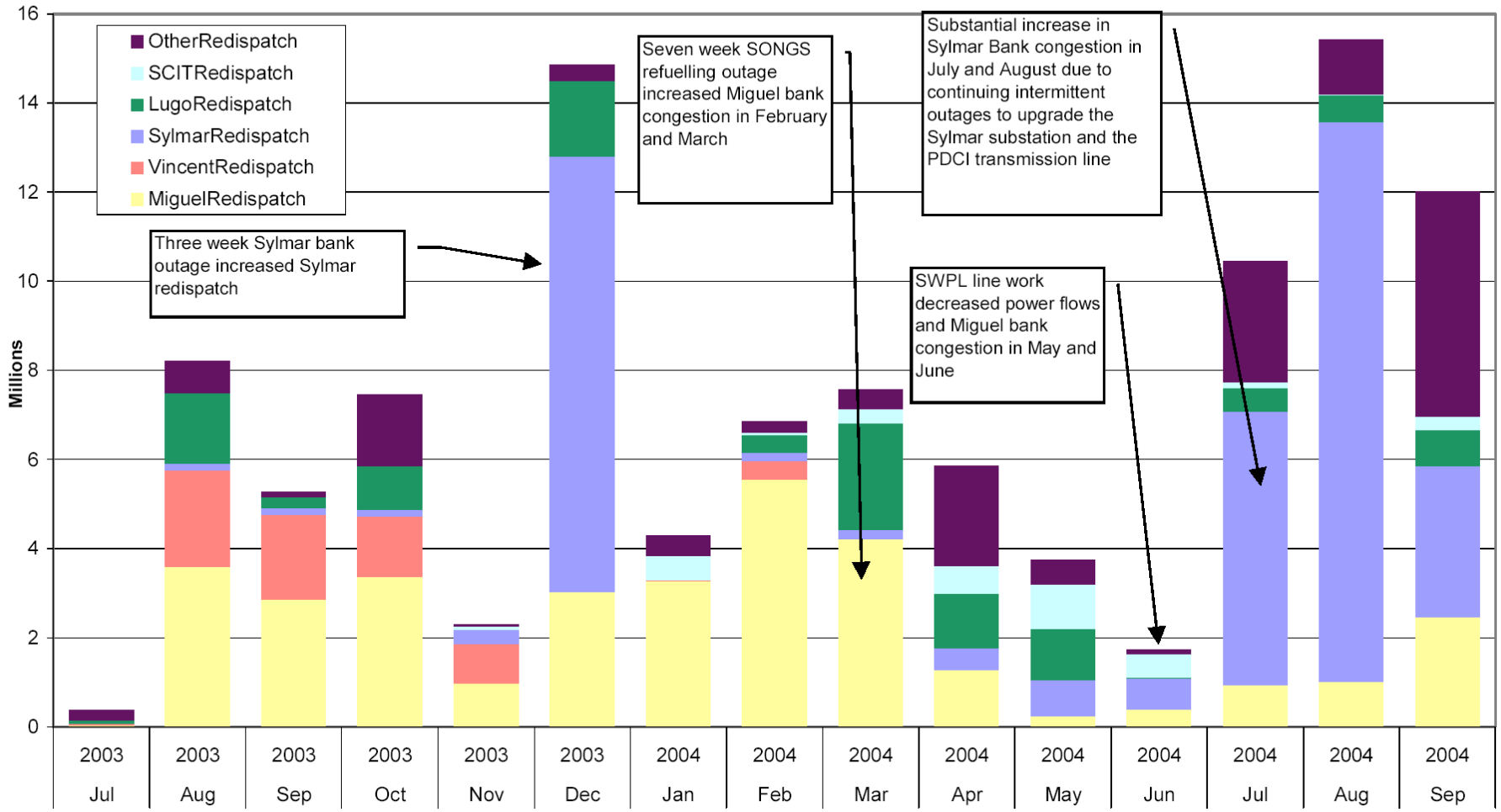
Monthly Total Intra-Zonal Congestion Costs

- MLCC (Minimum Load Cost Compensation) when MLCC units are called to run for congestion relief purposes
- RMR costs are attributed to congestion when they are called for generation levels above RMR requirements
- Total Congestion costs include RMR, MLCC Unit Calls, and Re-dispatch (inc'ing & dec'ing)

Monthly Total (Redispatch) Congestion Costs by Location / Cause

Figure 7. Monthly Total Congestion Costs by Location and/or Cause



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Monthly Total Congestion Costs by Location / Cause

- Congestion for “Three Week Sylmar Bank Outage”, was approximately $9.8 million
- Reason for the bank outage was not identified (scheduled maintenance or forced outage)
- Congestion identified as caused by DC Terminal upgrades at Sylmar during July, August, and September totaled to $32 million.
- DC terminal construction and testing continued until December, congestion cost information given on DMA reports for October thru December
- Congestion costs were paid primarily for dec’ing

Recent System Upgrades

- LADWP installed a third 220/230 transformer - bank G – in November or December of 2004. Path rating increased to 1600 MW.
- In December of 2004, the PDCI terminal work was completed.
- One 1550 MW pole now terminates in SCE's Sylmar bus and one pole terminates in LADWP's Sylmar bus.
- Results in a more balanced flow across the 220/230 transformers, further reducing congestion

Possible System Upgrades

- LADWP is re-powering Haynes, Valley, and Scattergood with more efficient combined cycle generation
- It appears that LADWP sometimes bids these resources to SCE and the ISO markets, resulting in congestion at Sylmar
- If Sylmar congestion continues, additional interconnection capacity may be beneficial
- Interconnection capacity upgrades could include:
  - Rebuilding the Laguna Bell – Velasco 220/230 kV emergency tie to operate normally closed
  - New Adelanto – Lugo 500kV line along with flow control devices added at Sylmar to curtail flows
  - In a 1994 report the LADWP identified an option of upgrading the Victorville – Century 287 kV lines to 500kV with a loop-in of the Lugo – Serrano 500kV line into a new sub called Upland. Such a configuration could offer significant benefits to LADWP and SCE systems.

The Bigger Picture

- Congestion Management is supposed to send pricing signals as to when transmission upgrades are needed – these are mighty expensive signals !
- Congestion costs for 10 months of operation would have paid for several new transformer banks
- Some sort of methodology / tool is needed to predict congestion and get transmission upgrades before congestion money is spent.